

CLAIMS

1. A gait generating device of a legged mobile robot for generating a desired gait of a legged mobile robot that travels by moving a plurality of legs extended from its body, comprising:

permissible range setting means for setting a permissible range of a restriction object amount, the restriction object amount being a vertical component of a floor reaction force moment to be applied to the robot or a component of the floor reaction force moment in floor surface normal line direction, or a vertical component of an angular momentum changing rate of the robot or a component of the angular momentum changing rate in floor surface normal line direction;

provisional motion determining means for determining a provisional motion of the desired gait such that a resultant force of a gravity and an inertial force acting on the robot satisfies a predetermined dynamic balance condition on a predetermined dynamic model; and

provisional motion correcting means for correcting the provisional motion to determine the motion of a desired gait by changing the changing rate of an angular momentum of the robot from the provisional motion, while limiting the restriction object amount to the permissible range on the dynamic model if the restriction object amount defined by the provisional motion of the desired gait deviates from the permissible range.

2. The gait generating device of a legged mobile robot according to Claim 1, wherein a motion to be corrected by the provisional motion correcting means is a motion of a body of the robot or an arm extended from the body.

5 3. The gait generating device of a legged mobile robot according to Claim 1, wherein, in the motion of the body of the robot or the motion of an arm extended from the body, the motion to be corrected by the provisional motion correcting means is a motion that changes the vertical
10 component of the angular momentum changing rate of the robot or the component of the angular momentum changing rate in floor surface normal line direction while substantially maintaining the position of center-of-gravity of the robot at the position of center-of-gravity
15 determined by the provisional motion.

4. The gait generating device of a legged mobile robot according to Claim 1, wherein the robot is a robot equipped with two arms extended from the right and left sides of the body, and the motion to be corrected by the
20 provisional motion correcting means is a motion for moving the two arms forward and backward relative to the robot in opposite directions from each other.

5. The gait generating device of a legged mobile robot according to Claim 1, wherein the desired gait is a gait
25 in which a landing period during which at least one leg of the robot is landed and a floating period during which all legs are floated in the air are alternately repeated, and

the permissible range is set to substantially zero at least during the floating period.

6. The gait generating device of a legged mobile robot according to Claim 1, comprising:

5 desired vertical component determining means for determining a desired vertical component of a translational floor reaction force of the robot or a desired vertical component of a total center-of-gravity acceleration or a desired vertical component of a body
10 acceleration,

 wherein the permissible range setting means sets the permissible range on the basis of a desired vertical component determined by the desired vertical component determining means.

15 7. The gait generating device of a legged mobile robot according to Claim 1, wherein the dynamic model is a dynamic model that describes at least the relationship between a motion to be corrected by the provisional motion correcting means and a floor reaction force as a
20 relationship between a rotational motion of a flywheel, which is rotative about a vertical axis or a floor surface normal line axis, and a floor reaction force.

 8. The gait generating device of a legged mobile robot according to Claim 1, wherein the provisional motion
25 correcting means determines a motion of the desired gait such that the motion of the robot to be corrected if the restriction object amount deviates from the permissible

range is approximated or matched to a predetermined reference motion trajectory in a predetermined period during which the restriction object amount determined by the provisional motion lies in the permissible range.

5 9. The gait generating device of a legged mobile robot according to Claim 1, wherein the desired gait to be generated has a current time gait generated for each predetermined period to be used for an actual motion of the robot, and a normal gait, which is a virtual cyclic
10 gait following each current time gait and which is used for generating the current time gait, and the processing of the provisional motion determining means and the provisional motion correcting means is carried out when generating the current time gait and/or a normal gait
15 following the current time gait.

10 10. The gait generating device of a legged mobile robot according to Claim 9, wherein the permissible range setting means sets the permissible range of the current time gait and the permissible range of the normal gait
20 following the current time gait on the basis of a required parameter of the current time gait.

25 11. The gait generating device of a legged mobile robot according to Claim 10, wherein the legged mobile robot is a bipedal mobile robot having two legs, and the required parameter includes parameters that define the landing positions/postures for two steps of the distal portions of the legs of the bipedal mobile robot and

parameters that define the gait cycles of a first step and a second step.